CLAIMS

What is claimed is:

1. A method for fabricating a dielectric layer comprising:

providing a substrate;

forming over the substrate a carbon and halogen doped silicate glass dielectric layer while employing a chemical vapor deposition method employing a carbon source material separate from a halogen source material.

2. The method of claim 1 wherein the carbon source material is a silicon and carbon source material.

3. The method of claim 2 wherein the silicon and carbon source material is an organosilane.

4. The method of claim 1 wherein the halogen source material is a silicon and halogen source material.

5. The method of claim 4 wherein the silicon and halogen source material is a silicon halide.

6. The method of claim 1 wherein the chemical vapor deposition method employs a substrate temperature of greater than about 250 degrees centigrade.

7. The method of claim 1 wherein the chemical vapor deposition method employs a substrate temperature of from about 250 to about 400 degrees centigrade.

8. The method of claim 1 wherein the carbon and halogen doped silicate glass dielectric layer is formed to a thickness of from about 2000 to about 20000 angstroms.

9. The method of claim 1 further comprising forming contacting the carbon and halogen doped silicate glass dielectric layer a carbon doped silicate glass dielectric layer absent halogen doping.

10. A method for fabricating a dielectric layer comprising:

providing a substrate;

forming over the substrate a carbon and halogen doped silicate glass dielectric layer while employing a chemical vapor deposition method employing a deposition temperature at least about 250 degrees centigrade.

11. The method of claim 10 wherein the deposition temperature is from about 250 to about 400 degrees centigrade.

12. The method of claim 10 wherein the chemical vapor deposition method employs a carbon source material separate from a halogen source material.

13. The method of claim 12 wherein the carbon source material is a silicon and carbon source material.

14. The method of claim 13 wherein the silicon and carbon source material is an organosilane.

15. The method of claim 12 wherein the halogen source material is a silicon and halogen source material.

16. The method of claim 15 wherein the silicon and halogen source material is a silicon halide.

17. The method of claim 10 wherein the carbon and halogen doped silicate glass dielectric layer is formed to a thickness of from about 2000 to about 20000 angstroms.

18. The method of claim 10 further comprising forming contacting the carbon and halogen doped silicate glass dielectric layer a carbon doped silicate glass dielectric layer absent halogen doping.

19. A microelectronic product comprising:

a substrate;

a carbon and halogen doped silicate glass layer formed over the substrate, the carbon and halogen doped silicate glass layer having a dielectric constant of greater than about 3.0.

20. The microelectronic product of claim 19 wherein the substrate is a semiconductor substrate.

21. The microelectronic product of claim 19 wherein the carbon and halogen doped silicate glass dielectric layer is a carbon and fluorine doped silicate glass dielectric layer.

22. The microelectronic product of claim 19 wherein the dielectric constant is from about 3.1 to about 3.3.

23. A microelectronic product comprising:

a substrate;

a bilayer dielectric layer formed over the substrate, the bilayer dielectric layer comprising:

a first dielectric layer formed of a carbon and halogen doped silicate glass dielectric material; and

a second dielectric layer contacting the first dielectric layer and formed of a carbon doped silicate glass dielectric material absent halogen doping.

24. The microelectronic product of claim 23 wherein the first dielectric layer is formed closer to the substrate than the second dielectric layer.

25. The microelectronic product of claim 23 wherein the second dielectric layer is formed closer to the substrate than the first dielectric layer.

26. The microelectronic product of claim 23 wherein the first dielectric layer and the second dielectric layer are patterned dielectric layers that define a dual damascene aperture within the microelectronic product.

27. The microelectronic product of claim 23 wherein the carbon and halogen doped silicate glass dielectric material has a dielectric constant of greater than about 3.0.

28. The microelectronic product of claim 23 wherein the carbon and halogen doped silicate glass dielectric material has a dielectric constant of greater than about 3.0 to about 3.3.

29. The microelectronic product of claim 23 wherein the carbon and halogen doped silicate glass dielectric material is a carbon and fluorine doped silicate glass dielectric material.